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**Department of Mechanical engineering…**

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**College of Engineering**

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**University of salahaddin…**

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**Subject: …statics……………………………….**

**Course Book of first year**

**Lecturer's name:-Professor. Dr.ShawnimR.jalal**

**Academic Year: 2019- 2020**

**Second course**

**Course Book**

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| **1. Course name** | **statics** | |
| **2. Lecturer in charge** | **Dr.shawnimR.jalal** | |
| **3. Department/ College** | **College of engineering-mechanical& mechatronic department** | |
| **4. Contact** | **e-mail:shawnim100@yah00,com**  **Tel: (optional) 0750 4709424** | |
| **5. Time (in hours) per week** | **Theory: 2**  **Practical: 1** | |
| **6. Office hours** | **6 hours** | |
| **7. Course code** | **-** | |
| **8. Teacher's academic profile** | * **Dr.ShawnimR.jalal Professor in** [**Mechanical Engineering**](https://www.wpi.edu/academics/me) * I enjoy teaching at the undergraduate and graduate levels. Teaching is very rewarding, and it allows me to interact with the students. My teaching for (32 years) portfolio includes undergraduate and graduate level courses in the areas of metallurgy, material science, corrosion, casting ,welding and engineering mechanics.   I have More than 27 papers published in mechanical engineering fields in many journals and conference  In and out of Iraq. Participating in more than 28 work shop and conferences in the word. worked in Salahaddin university from 1987 until now and teaching also in **sulaymani and koya university**  **Education**  B.S., in- In engineering metallurgy and production / Iraq / University of Technology / Baghdad /1982  Msc- In engineering metallurgy and production / Iraq / University of Technology / Baghdad /1985  PhD-In engineering metallurgy / Iraq / University of Salahaddin / Erbil / 2004 | |
| **9. Keywords** | **Statics,forces,equlibirum,friction,centroid** | |
| **10. Course overview:**  Statics is the study of methods for quantifying the forces between bodies. Forces are responsible for maintaining balance and causing motion of bodies, or changes in their shape. You encounter a great number and variety of examples of forces every day, such as when you press a button, turn a doorknob, or run your hands through your hair. Motion and changes in shape are critical to the functionality of man-made objects as well as objects the nature.  Statics is an essential prerequisite for many branches of engineering, such as mechanical, civil, aeronautical, and bioengineering, which address the various consequences of forces.  This course contains many interactive elements, including: simulations; “walk-throughs” that integrate voice and graphics to explain a procedure or a difficult concept; and, most prominently, computer tutors in which students practice problem solving with hints and feedback.  This course uses algebra and trigonometry and is suitable for use with either calculus- or non-calculus-based academic statics courses. Completion of a beginning physics course is helpful for success in statics, but not required. Many key physics concepts are included in this course. | | |
| **11. Course objective:**  “Static” is a well-established topic in Mechanical Engineering, taught to the senior students (1st year), through a theoretical weekly program of two hours supported by one hour practical applications.  In this course we introduce some of basics for engineering mechanics. The objective in the first two chapters is to study the effects of forces acting on bodies, resultants of these forces, scalar and vector quantities, couple, and resolution of a force into a force and couple.  In third and fourth chapters they will study the centroid of gravity for bodies. Its coordinate of centre of a system, centre of pressure, then find the moment of inertia of the body (mass), Second moment of inertia, and radius of gyration.  In fifth and sixth chapters they will study equilibrium of the bodies for flexible cord, rope, smooth surface, roller or ball, pins, then making free body diagram for compound bodies. After that they will study friction between two bodies, Sliding or tipping, laws of friction and so on.  All these chapters are supplied with a lot of solved problems and examples with homework questions. | | |
| **12. Student's obligation**  Obligations would be the direction the discussion should take. Students may list obligations suggested in the question and attempt to find a course of action that meets as many obligations as is possible. If the student concludes that creep is the dominate mode of failure, she should address part b of the question through group  Discussion, they should be directed to understand how this conclusion is technically unlikely (have her calculate the time for a typical window to creep to failure, develop a mechanism for a window to creep to failure). | | |
| **13. Forms of teaching**  Different forms of teaching will be used to reach the objectives of the course: power point presentations for the head titles and definitions with solved problems by using data show. There are enough amounts of solved examples and unsolved questions in the last of each chapter to give students another chance to learn more.  Furthermore whiteboards are used for solving examples and additional explaining objects, and also the students have one hour weekly for application, by supervising lecturer and engineers.  For the student to achieve a level of excellence in this subject, the following points should be given utmost consideration:   * Class attendance on regular basis for the purpose of learning. On administrative level if the student absence rate exceeded (10% of the total lecture hours, the student will be expelled, the total lecture hours is (60), therefore if student is being absent for (6) hours, therefore will put on expel list. * Active participation in class discussions * Reviewing the lecture notes and topics on weekly basis, noting the ambiguous points, if any, and requesting clarification during instructor office hours * Giving adequate and sufficient priority to preparing for weekly, monthly and final tests | | |
| **14. Assessment scheme**Attaining the requirements set to succeed in this study subject requires developing an engineering sense, related to this topic, based on emergent analytical and problem solving skills and memorizing topics cannot secure success.  According to bologna process student are required to follow academic calendar of each semester ,then implementing and following every requirement to complete the course to the end .practical work ,homework, work sector ..etc.  \*\*Student should register for an exam. During the designated exam. Registration period.  \*\*student can withdraw from registered exam. On week prior to exam. Data.  \*\*to register to an exam. The student should fulfil the requirement pre-specified by the module professor. Otherwise ,the exam. Registration will automatically be cancelled.  \*\*for each module per semester, the grades are determined by the individual respective module examiner.  The following grade system is used to for the evaluation of the exam.  Grad Number Grad Exam. Mark range (out of 100)  1 very good 90-100  2 good 75-89  3 Satisfactory 60-74  4 Sufficient 50-59  5 not sufficient <50  **Calculators**: Standard scientific calculators are allowed for use during all quizzes, midterms and the final exam. Programmable calculators and wireless devices (*e.g.*, cell phone, iPod/Pad, etc.) are not permitted.  ‌ | | |
| **15. Student learning outcome:**   |  | | --- | | **Learning Outcome** | | Understand the fundamentals of statics and dynamics. | | Be proficient in using Statics and Dynamics to obtain solutions to engineering problems. | | Know the value of engineering mechanics. | | Relate the fundamentals of Statics and Dynamics to practical applications. | | Develop documentation skills and correct professional technique. | | Develop “engineers’ eyes” soThis course provides the following outcomes:     1. Apply mathematics 2. Identify engineering problems | | | |
| **16. Course Reading List and References‌:Course material:**  Text books:   1. Engineering Mechanic’s, Static And Dynamic by Archie Higden 2. Engineering Mechanic’s, Static and Dynamic by Singer 3. Engineering Mechanic’s, Static and Dynamic by Meriam And Kraige   4. Mechanic for Static’s and Dynamic by Johnson  5. Engineering Mechanic’s, Static and Dynamics by Schaum’s  The core materials of the course consist of the above books, articles from media ,lecture's notes and internet . | | |
| **17. The Topics:** | | **Lecturer's name** |
| The academic year program: 2018  Chapter one : Basic concepts Week 1:- Introduction, course outline, Scalar and vector quantities. Forces, composition and resolution of forces. Week 2 :- Moment of a force, principle of moments, couples, Transformation of a couple, and Resolution of a force into a force and a couple.  Chapter two: Resultants of  force systems Week3:- Introduction, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system Week4: - Resultant of a concurrent, non coplanar force system Resultant of a parallel, non coplanar force system and resultant of couples in space.  Chapter three: Centroid and centre of gravity Week 5:- Introduction, centre of gravity of a system of particles Week 6:- The centre of gravity of a body, Centroids and centre of pressure  Chapter four: Second moment or moment of inertia Week7:- Introduction, The parallel axis theorem for areas, Second moment of area Week 8: - Radius of gyration and Moment of inertia of composite areas  Chapter five: Equilibrium and trusses Week 9:- Introduction, Free body diagram Week10:- Equation of equilibrium for systems Week 11: -Trusses Week12: General procedure for solution of problems in trusses.  Chapter six: Friction Week 13:- Introduction, Nature of friction Week14:- Laws of friction and Coefficient of friction Week15: -Types of problems involving frictional forces, friction of V-belts, Frictional moments on thrust bearings and disk clutches. | | Shawnimjalal |
| **18. Practical Topics (If there is any)** | | 1hr. |
| As above | |  |
| **19. Examinations: all examination involved problems which must be resolved such as :-**  **Example 1**  The sack has weight *W* and is supported by  the six cords tied together as shown.  Determine the tension in each cord and the  angleθfor equilibrium. Cord *BC* is horizontal.  Given:  *W* = 15 lb  θ*1* = 30 deg  θ*2* = 45 deg  θ*3* = 60 deg    Solution:  Guesses *TBE* = 1 lb*TAB* = 1 lb  θ= 20deg *TBC* = 1 lb*TAC* = 1 lb  *TCD* = 1 lb*TAH* = 1 lb  Given  At *H*:  +↑Σ*Fy*= 0; *TAH* −*W* = 0  At *A:*  →+ Σ*Fx*= 0; −*TAB* cos(θ*2*) + *TAC* cos(θ*3*) = 0  +↑Σ*Fy*= 0; *TAB* sin(θ*2*) + *TAC* sin(θ*3*) −*W* = 0  At *B*:  →+ Σ*Fx*= 0; *TBC* −*TBE* cos(θ*1*) + *TAB* cos(θ*2*) = 0  +↑Σ*Fy*= 0; *TBE* sin(θ*1*) −*TAB* sin(θ*2*) = 0  At *C*:  →+ Σ*Fx*= 0; *TCD*cos(θ) −*TBC* −*TBE* cos(θ*3*) = 0  +↑Σ*Fy*= 0; *TCD*sin(θ) −*TAC* sin(θ*3*) = 0 | | |
| **20. Extra notes:**  -A significant portion of this course was taught at the blackboard, so the following lecture notes are not intended to fully capture the content of the course. The lecture notes tend to be more detailed in the second half of the course. Lecture summaries are also available for the first half of the course.  This section also contains handouts summarizing important [variables and concepts](http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-050-engineering-mechanics-i-fall-2007/lecture-notes/#Variables_and_Concepts).  .- Exams must be completed within the allotted time. Students may use a scientific calculator for the exam but may not reference any other material including the textbook, notes, and any other electronic devices.  -The comprehensive exam will be taken in class and cannot be retaken or dropped. | | |
| **21. Peer reviewپێداچوونه‌وه‌یهاوه‌ڵ**  This course book has to be reviewed and signed by a peer. The peer approves the contents of your course book by writing few sentences in this section.  *(A peer is person who has enough knowledge about the subject you are teaching, he/she has to be a professor, assistant professor, a lecturer or an expert in the field of your subject).*  ئه‌مکۆرسبووکه‌ ده‌بێتله‌لایه‌نهاوه‌ڵێکیئه‌کادیمیه‌وه‌ سه‌یربکرێتوناوه‌ڕۆکیبابه‌ته‌کانیکۆرسه‌که‌ په‌سه‌ندبکاتوجه‌ندووشه‌یه‌کبنووسێتله‌سه‌رشیاویناوه‌ڕۆکیکۆرسه‌کهوواژوویله‌سه‌ربکات.  هاوه‌ڵئه‌وکه‌سه‌یه‌ که‌ زانیاریهه‌بێتله‌سه‌رکۆرسه‌که‌ وده‌بیتپله‌یزانستیله‌ مامۆستاکه‌مترنه‌بێت.‌‌ | | |